Frequency Issues Facing the FCC – Technical Discussion

LCC International

July 17, 2003

Agenda

- Frequency Bands with Issues
- Focus on 800 MHz
  - Causes of Interference
  - Interference mitigation Planning
  - Competing 800 MHz Plans
  - Implementing the “Consensus” Plan
- Public Sector Thoughts

Bands with “Issues”

Interference Type / Band Services	OOBE	Equipment performance	IM
CMRS/PSAP	☑	☑	☑
MDS / MMDS	☑	☑	
WCS/DARS	☑	☑	

Conclusions

- Dissimilar system architecture/design criteria should not be in the same band
- Evolutions in hardware technology and corresponding changes in use of technology will cause older equipment to develop difficulties working in the same environment with newer equipment.
- Proper frequency management is made more difficult when systems are interleaved.

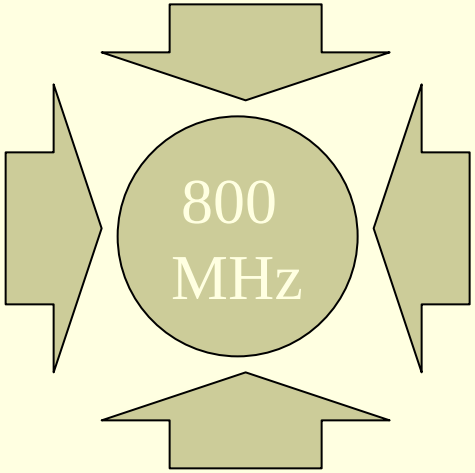
Focus on 800 MHz Stakeholders

OEM

- Motorola provides most public safety systems
- Sole supplier of Nextel iDEN technology.

CMRS

- Will continue to increase capacity demands
- Would like to eliminate time consuming and costly coordination for each occurrence of interference.
- Want ability to implement new technologies without detailed prior coordination.



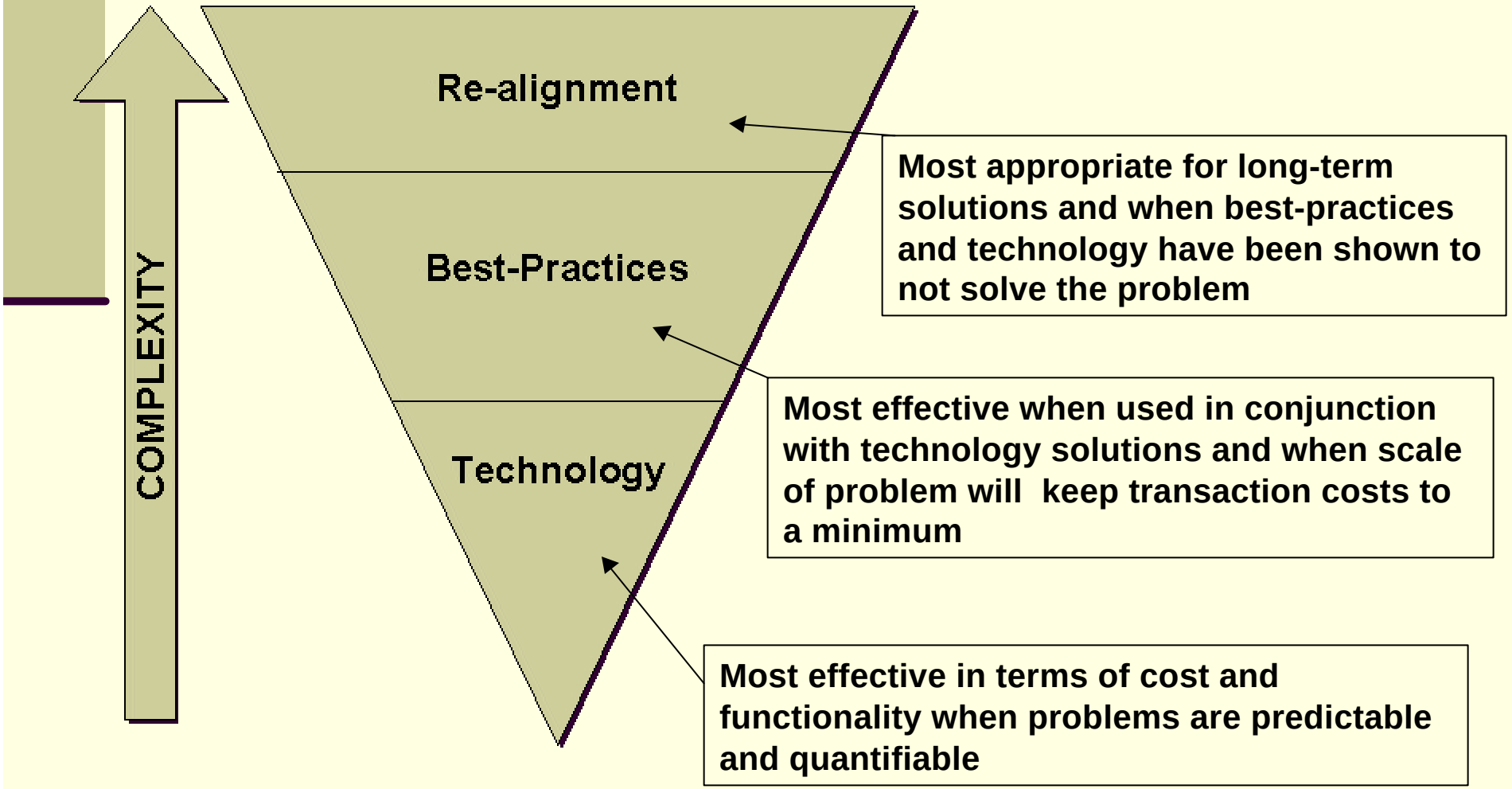
B / ILT

- Must fund migration to 900 MHz band if cost exceed 800 MHz migration
- Some licensees will be difficult to move due to large subscriber base. (Motient)

Public Safety

- Needs to tie in with Homeland security
- Interference impedes use for critical communications.
- Plans on the table already to upgrade to P25 but lacking budget.

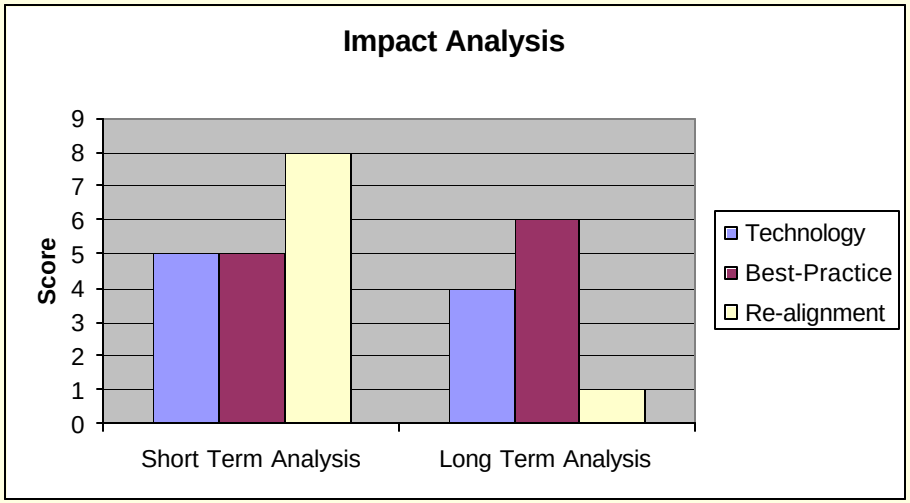
Interference Mitigation Plans



Ingredients of a Workable Realignment Plan

- Primary goals of migration plan
  - Long-term solution
  - Minimizes disruption to Public Safety
  - Minimizes disruption to other stakeholders
  - Minimizes costs
- Secondary goals
  - Spectrum efficiency
  - Migrates public safety towards greater interoperability
  - Minimizes transaction (coordination) costs for all parties.

Short-term & Long-term Impact



NOTE: Lower score is "better". No weightings were assigned to adjust for degree of disruption or cost. Weightings could have the effect of shifting the results.

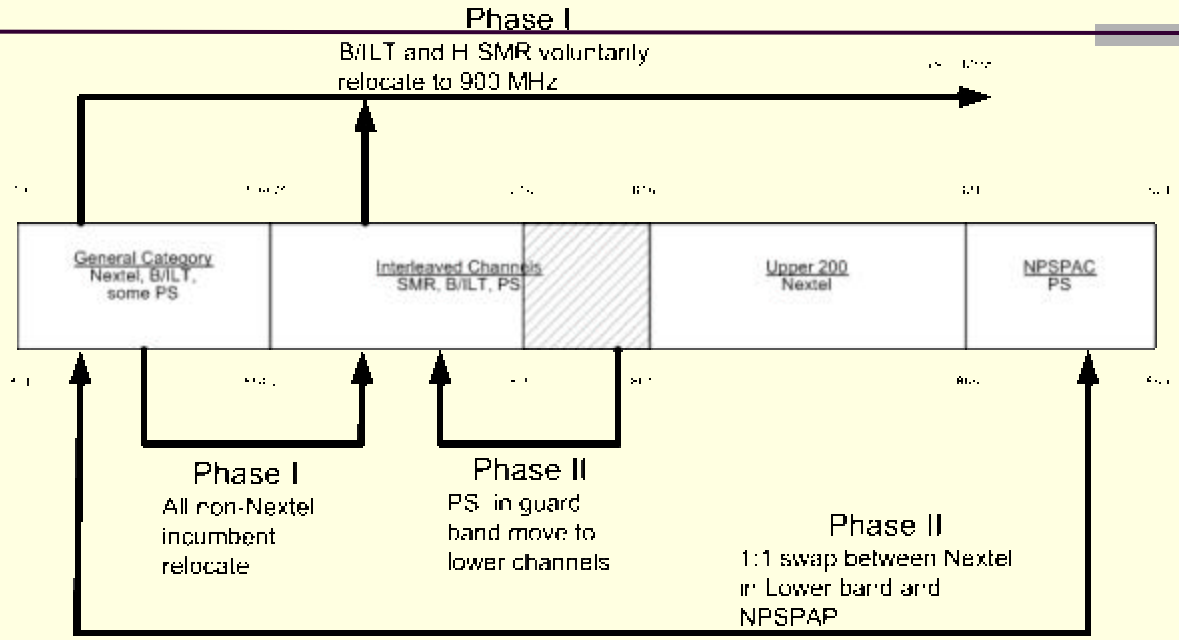
- Comparison of the four types of migration plans in terms of
  - "Disruption" factors
  - Hardware cost factors
  - Transaction cost factors
  - Border transaction cost factors
- For the short-term, a technology or best-practices based solution will provide the best solution.
- For the long-term, a band realignment solution will provide the best solution

Competing 800 MHz Re-alignment Plans

Plan	Key Points	Pros	Cons	Major Supporters
Consensus Plan	■Band re-alignment ■Use of Best Practices ■Increase of PS spectrum ■Nextel to vacate 900 Mhz spectrum in exchange for replacement 1.9 MHz spectrum.	■Will greatly reduce interference issue to Public Safety. ■Minimizes disruption to incumbents.	■Does not take market value of spectrum into consideration. ■High short-term transaction costs. ■Requires B/ILT to pay their own relocation costs or accept secondary status.	■Nextel ■Many Public Safety groups
800 MHz Users Coalition	■Case-by-case interference correction ■Use of improved Best Practices. ■Re-alignment only if necessary.	■Less disruption for most spectrum users ■May work until 700 MHz spectrum is freed up.	■High transaction costs to CMRS. ■May not solve problem in long term ■Reactive vs pro-active solution	■CTIA, ■Most WSP ■Some Public Safety agencies
Motorola Plan	■Technology solution for interference	■Can be accomplished with little disruption frequency assignments of existing users	■Will not solve all problems in the long term	■Motorola

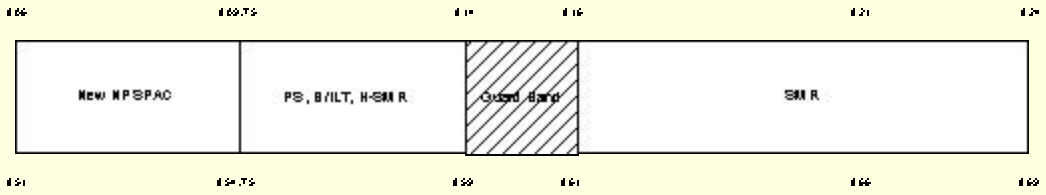
December 2002 Revised Consensus Plan

Current Bandplan



- Phase I: All non-Nextel incumbents exit the 806-809/851-854 MHz band
  - Voluntarily relocating to 900 MHz or in available spectrum at 809-814/854-859
- Phase II: All PS exit guard band and a 1:1 switch between NPSPAC and Nextel in the 806-809/851-854 Band

Consensus Bandplan v2



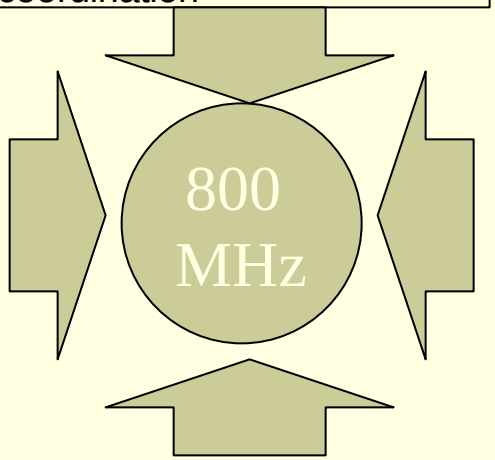
Result of Consensus plan

Border Area Users

- Possible treaty re-negotiation
- New Channel plan for NPSPAC will require closer coordination

CMRS

- Consolidated operations in contiguous bands
- Reduced transaction costs due to interference issues
- Give up 900 MHz and 700 MHz guard band spectrum
- Replacement spectrum for 900 MHz



B / ILT

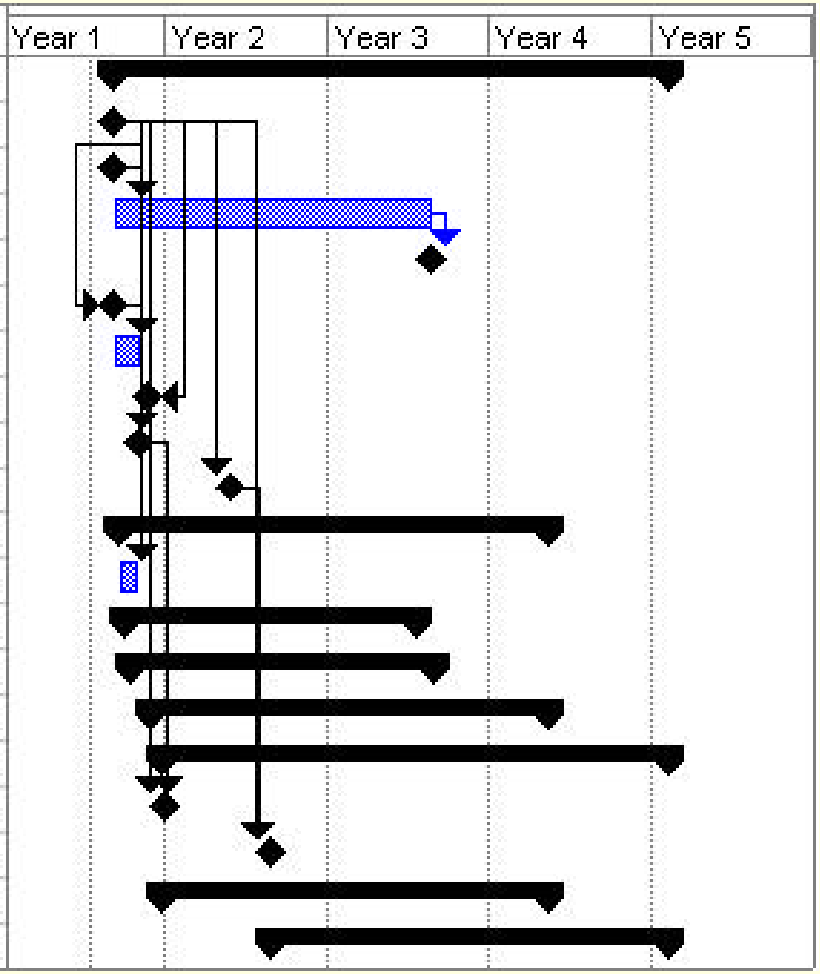
- Plan does not address difficulties of relocation of some of the GC licensees.
- Some users will receive fewer channels.

Public Safety

- Consolidated operations in contiguous band next to 700 MHz band
- Increase in number of public safety channels
- Reduced interference

Implementing the Consensus Plan

ID	Task Name	Duration
1	**Consensus Plan Timeline**	**900 days**
2	FCC Report & Order	0 days
3	Start Border Negotiations	0 days
4	Negotiations	720 edays
5	Revised agreement accepted	0 days
6	Public Notice to Supply Phase I incumbent inform	0 days
7	Notification by PS if they wish to move from Gu	60 edays
8	Deadline for B/MLT to notify RCC of intent to mov	0 days
9	Public Notice to supply Phase II Region 1-14 NPS	0 days
10	Public Notice to supply Phase II Region 15-55 NF	0 days
11	**Phase I**	**698 days**
12	System Information to RCC for Phase I syst	40 edays
13	**Clear New NPSPAC Band**	**475 days**
22	**Relocate PS and B/MLT in New NPSPAC**	**490 days**
30	**Relocate PS and B/MLT in New NPSPAC**	**648 days**
38	**Phase II**	**820 days**
39	System Information to RCC for Phase II Rec	0 days
40	System Information to RCC for Phase II Rec	0 days
41	**Relocation of NPSPAC and Guard Band**	**628 days**
51	**Relocation of NPSPAC and Guard Band**	**642 days**



Border Issues

- According to comments filed with the commission, the revised consensus plan will not adequately address all border issues.
  - Double border issues (international & “heartland” US)
  - Treaty re-negotiations will be required.
  - Increased transaction costs
  - Lack of necessary spectrum in interleaved block to accomplish transition.

Final Thoughts

- As P25 is implemented, we believe that several factors/arguments will lead towards a “cellularization” of public safety networks:
  - As funds become available from various programs (e.g. Homeland Security and others) there will be some momentum to deploy advanced and more reliable (i.e. more sites) systems.
  - System capacity will need to increase (i.e. more sites) as data applications become more prevalent for file transfers, record sharing, etc.
  - A "virtual office" environment will lead to a more mobilized workforce with greater productivity
  - Community relations improve as a result of greater visibility of a mobilized workforce
  - A more mobilized workforce shortens response times for emergency services

Final Thoughts

- Assuming a trend towards P25 “cellularization”, there remains the concern that remaining interleaved H-SMR and B/ILT systems will experience interference from Public Safety.
- The likelihood and severity of such problems is a complex problem to solve at this point, however the following points and questions should be considered.
  - Duty cycle: Will the P25 systems have a duty cycle that promotes harmful interference like CMRS does today? e.g. iDEN (always on, no DTX) and cellular (busy hour activity)
  - Location: Tower sites generally have a less obstructed surrounding, increasing the likelihood and severity of the "zone of destruction". The zone of destruction can be up to 1/4 mile from the base station, typically less. How much general access is available to such areas?
  - Target system: How is the target (interfered) system used? If the target system is used in a highly mobile, will these short distances severely impact service? Again, how much access will the users of the target system have to zone of destruction areas?